CITY OF RENTON
Development Services Division
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2009 WSEC SINGLE FAMILY COMPLIANCE CHECKLIST

THIS CHECKLIST MUST BE COMPLETED FOR ALL SINGLE FAMILY AND DUPLEX NEW CONSTRUCTION AND ADDITIONS.

THIS CHECKLIST ALONG WITH THE APPROVED PLANS MUST BE KEPT ON THE JOB AT ALL TIMES. INSPECTORS CANNOT PERFORM INSPECTIONS WITHOUT IT.

1. **About this checklist:** This checklist is not as involved as it looks, because you only use portions of it for a particular dwelling project. This should be thought of as a tool for learning the residential Energy Code requirements.

   Requirements are grouped by foundation, framing, insulation, and final inspection phases. This not only lets you know what you need to do but also when the inspector will be checking for particular requirements. Use the checklist to choose compliance options that best suit the economics and design of your project.

   If you have questions, you may contact Jan Conklin at (425) 430-7276.

2. **Responsibility for information:** Although staff members will help you with general questions about completing this checklist, it is ultimately your responsibility to provide detailed information about heating systems, glazing, insulation, and other building specifications.

3. **Page 1, Compliance Options:** Select <u>one compliance option</u> AND <u>select a credit option</u>. Your building must match the selected option requirements without exceptions or substitutions.

4. **Pages 2 through 6:** Provide information as required but do not fill in the columns labeled "COMPLIANCE REQUIRED" or "INSPECTION APPROVED"**.**

   Since this checklist will be evaluated for completeness and accuracy, you can avoid unnecessary permit delays by carefully providing all required information. You may disregard items that don't address your particular building or equipment.

<u>EFFECTIVE 1/1/2011</u>

ALL RESIDENTIAL OCCUPANCIES

ALL FUEL TYPES

CHAPTER 6, PRESCRIPTIVE OPTIONS FOR SINGLE FAMILY AND DUPLEX OCCUPANCIES

INSTRUCTIONS:

1) Carefully review the requirements of each of the Options below. Choose an Option that best suits your dwelling design. Glazing percentage typically determines which Option to choose. Your building must match the selected Option requirements without exceptions or substitutions.

SINGLE FAMILY AND DUPLEXES

		Standard Option	
Check appropriate box	OPT 1 ☐	OPT 2 ☐	OPT 3 ☐
GLAZING MAX: % OF FLOOR	13%	25%	Unlimited
U-FACTOR– VERTICAL	.34	.32	.30
U-FACTOR-Overhead (Skylights)	.50	.50	.50
DOOR U-VALUE	.20	.20	.20
CEILINGS:			
WITH ATTICS	R-49	R-49	R-49
VAULTED*see below	R-38	R-38	R-38
WALLS:			
ABOVE GRADE	R-21 INT*	R-21 INT*	R-21 INT*
BELOW GRADE			
INTERIOR	R-21 TB**	R-21 TB**	R-21 TB**
EXTERIOR	R-10	R-10	R-10
FLOOR:	R-30	R-30	R-30
SLAB ON GRADE:	R-10	R-10	R-10

* Intermediate Framing – R-10 insulated headers
** Thermal Break Required
R-values are for wood frame assemblies only

*Single rafter or joist vaulted ceilings where both (a) the distance between the top of the ceiling and the underside of the roof sheathing is less than 12 inches and (b) there is a minimum of 1-inch vented airspace above the insulation.

CHAPTER 9 CREDITS: (See pages 7-8 for explanation)

☐ 1a HIGH EFFICIENCY HVAC1(1)
☐ 1b HIGH EFFICIENCY HVAC2(2)
☐ 1c HIGH EFFICIENCY HVAC3(1)
☐ 2 HIGH EFFICIENCY DUCTS(1)
☐ 3a EFFICIENT ENVELOPE1(0.5)
☐ 3b EFFICIENT ENVELOPE2(1.0)
☐ 3c SUPER EFFICIENT ENVELOPE(2.0)
☐ 4a EFFICIENT AIR LEAKAGE CONTROL1 (.5)
☐ 4b EFFICIENT AIR LEAKAGE CONTROL2 (.5)
☐ 5a EFFICIENT WATER HEATING1 (0.5)
☐ 5b EFFICIENT WATER HEATING2 (1.5)
☐ 6 SMALL DWELLING UNIT (1)
☐ 7 LARGE DWELLING UNIT (-1)
☐ 8 RENEWABLE ELECTRIC ENERGY (0.5)

FOUNDATION PHASE

COMPLIANCE REQUIRED INSPECTION APPROVED

☐ ☐ 1) Slab insulation R10 required.
_____a. Exterior - See #20 & #32
_____b. Interior – from top of slab - 24" vertically or horizontally – 2" nailer allowed

☐ ☐ 2) Radiant Slab insulation R-10 required under whole slab.

☐ ☐ 3) Thermal break(s) shall be placed in the slab between conditioned and unconditioned space checked below:
_____a. dwelling/garage
_____b. dwelling/connected space
_____c. slab edge and foundation wall

MECHANICAL AND PLUMBING PHASE

☐ ☐ 4) Exhaust ventilation shall be provided for each dwelling unit as follows:

Location	**Minimum CFM** **Intermittent/Continuous**	**Manufacturer and Model#**	**CFM (.1 W.G.)**
Kitchen fan	100 CFM / 25 CFM		
Bathroom fan	65 CFM / 20 CFM		
Bathroom fan	65 CFM / 20 CFM		
Bathroom fan	65 CFM / 20 CFM		
Laundry fan	65 CFM / 20 CFM		
Whole house fan – Continuous Operation			
45 CFM (1-3 bedrooms, <1500 SF)			
60 CFM (2-4 bedrooms, <3000 SF)			
90 CFM (3-5 bedrooms, <4500 SF)			

Whole house fan required in all new houses/dwelling units and all additions >500 square feet

Whole house fan must be ultra quiet and must be labeled "Whole House Ventilation"

☐ ☐ 5) Whole house fan:
Location _____ Sone rating (.1W.G.)_____
a. Whole house fan must be readily accessible and operating instructions provided to occupant
b. Whole house fan shall be listed and labeled "for continuous use"
c. Whole house fan shall be labeled "Whole House Ventilation (see operating instructions)"

☐ ☐ 6) Mechanical exhaust fan ducts shall be ≥ 4" and properly sized.

☐ ☐ 7) Mechanical exhaust fan ducts shall be insulated to R-4 in unconditioned spaces.

☐ ☐ 8) Mechanical fresh air supply ducts shall be insulated to R-4 in conditioned spaces.

☐ 9) Heating system requirements will be met with the following:
Mfr. _____ Model # _____
Output _____ Fuel Type _____ Efficiency rating (AFUE)_____

☐ ☐ 10) Supply and return air ducts shall have sealed joints and seams in unconditioned spaces.
Tapes and mastics listed in accordance with UL181A or B – **NO DUCT TAPE PERMITTED**

☐ ☐ 11) HVAC plenums, supply, and return air ducts insulated to R-8.

☐ ☐ 12) Water heaters shall have:
a. Separate power, or gas shut-off
b. Non-compressible R-10 pad (electric in unheated spaces or on concrete floors)
c. Temperature setting of 120F

FRAMING PHASE

☐ 13) Glazing efficiency required shall be: ☐
__U≤ .34 Options 1 __U≤ .32 Options 2 __U≤ .30 Options 3

☐ 14) Window specifications: ☐

Manufacturer	U-Factor

☐ 15) Skylight specifications – Maximum U-factor = .50 ☐

# of Skylights	Manufacturer	Area	U-Factor

☐ 16) Allowed glazing area is derived by dividing the total glazing area of _____SQ FT ☐
by the total floor area of _____ SQ FT
This value cannot exceed the glazing percentage of your option:
__≤ 13% Option 1 __≤ 25% Option 2 __≤ Unlimited Option 3

☐ 17) Window and door air leakage measures shall be met as follows: ☐
Exterior joints sealed, caulked, gasketed or weatherstripped

☐ 18) Insulation shall be placed in concealed places such as: ☐
1) Behind shower/tub
2) Behind partition studs/corners

☐ 19) Standard air leakage is complete and installed in the following: ☐
1) between sole plate/subfloors
2) wiring/plumbing/duct register penetrations
3) rim joists/mud sills (heated lower floors)
4) partition stud penetrations
5) around window/door frames

INSULATION PHASE

☐ 20) Exterior slab insulation shall be R-10 and approved for below grade use. ☐

☐ 21) Walls, including rim joists, shall be insulated to: ☐
☐ R-21 with Intermediate Framing – headers insulated with R-10

☐ 22) Interior below grade walls shall be insulated to: ☐
☐ R-21 with a thermal Break

☐ 23) Skylight wall insulation equivalent to the wall R-values. ☐

☐ 24) Insulation baffles shall be placed in ceilings to maintain at least 1" ventilation space and extend 6" vertically above batts or 12" vertically above loosefill insulation. ☐

☐ 25) Vapor retarders shall be installed toward the warm surface ☐
Select one option for floors, walls, and ceilings:

Floors:
☐ Plywood w/exterior glue ☐ Poly ≥ 4 Mill ☐ Backed batts

Walls:
☐ Poly ≥ 4 Mill ☐ Face-stapled backed batts

Ceilings: Not required where ventilation space > 12" above insulation
If less than 12": ☐ Face stapled backed batts ☐ Poly ≥ 4 Mill

FINAL PHASE

FOR FINAL INSPECTION: COVERS TO BE REMOVED FROM EXHAUST FANS AND CAN LIGHTS SO INSPECTOR CAN VERIFY COMPLIANCE WITH CODE

☐ ☐ 26) Envelope floors shall be insulated to R-30 all Options

☐ ☐ 27) Ceilings with attic above shall be insulated to R-49 all Options or R-38 with Advanced Framing

☐ ☐ 28) Single Rafter or Joist vaulted ceilings shall be insulated to R-38

☐ ☐ 29) Door systems shall meet:
☐ U-value = .20 (Metal insulated or fiberglass insulated only (wood doors do not meet this u-value)
Door #1: _____ #2) _____
One exempt door allowed: #3) _____

☐ ☐ 30) Fresh air shall be provided for each dwelling unit as follows:
☐ Tested, screened, controllable, through wall port
☐ Vented window frames
☐ Integrated with a Central forced air furnace which delivers outside makeup air through ducting system and requires furnace fan to be controlled by a timer set at 8 hours/day

☐ 31) Fresh air shall be provided for each dwelling unit as follows:
1) Each bedroom 3) Overall living area
2) Each Recreation Room 4) Other "habitable" rooms

☐ ☐ 32) Exposed foam insulation shall comply as follows:
Protected w/metal or plastic flashing that extends below grade
Be approved for subgrade, exterior use & properly installed.

☐ ☐ 33) Airflow between fresh air ports and whole house fan ensured by ½" undercut doors/grills.

☐ ☐ 34) Loosefill insulation OK if maximum ceiling slope not > 3 in 12 and there is ≥ 30" of clear distance from top of bottom chord to underside of roof sheathing at the roof ridge.

☐ ☐ 35) 6 mil black poly ground cover, lapped 12" at joints

☐ ☐ 36) Clearances shall meet listed, minimums between insulation and chimney

☐ ☐ 37) Attic hatch insulated to ceiling R-value and weather-stripped.

☐ ☐ 38) Attic access shall have wood dam to retain loose-fill insulation.

☐ ☐ 39) All exterior doors to be weather-stripped.

☐ ☐ 40) Heat pump thermostat shall have programmable capability.

☐ ☐ 41) Caulking is installed around light fixtures and flue penetrations.

☐ ☐ 42) Service hot & cold water piping to be insulated to R-4 in unconditioned spaces.

☐ ☐ 43) Service recirculation hot water piping shall be insulated per code.

☐ ☐ 44) Supply ducts shall have volume dampers to balance the system.

☐ ☐ 45) Programmable thermostat with a minimum 5-2 schedule for main HVAC system

☐ ☐ 46) Readily accessible, automatic or manual means provided to restrict or shut-off heating input to each zone or floor

☐ ☐ 47) Backup heat prohibits simultaneous operation of primary system.

☐ ☐ 48) Spot exhaust fans to have timer, dehumidistat, or switch.

☐ ☐ 49) Showers and lavatories shall limit flow to ≤ 2.5 gals per minute.

☐ ☐ 50) All fireplaces shall have:
a) 6 sq in comb. air supply duct with damper connected to fire box
b) Tight fitting ceramic glass or metal doors
c) Tight fitting flue damper

☐ ☐ 51) Solid fuel burning appliances shall have:
a) Tight fitting ceramic glass or metal doors
b) Outside combustion air source directly connected to fire box
c) Exceptions - see code

☐ 52) Recessed lighting fixtures shall be IC rated and labeled under ASTM E283 with tested air leakage < 2.0 CFM, no slots or holes in cans, caulked or sealed between can and ceiling

☐ ☐ 53) Indoor lighting shall be 50% compact fluorescent (pin based, or screw in) or T-8 or smaller lamps

☐ ☐ 54) All Outdoor lighting permanently mounted to a building shall be high efficacy. Or have a motion sensor and photo daylight control

PLAN REVIEWER APPROVAL: _____ DATE: _____

FINAL INSPECTION APPROVED:

INSPECTED BY: _____DATE:_____

Basic Changes to the 2009 Energy Code

Envelope Changes:

1. R-49 in the Ceiling or R-38 with advanced framing.
2. R-10 insulated headers in walls – still R-21 in wall, but now header has to be insulated.
3. Floor insulation must be installed in permanent manner and in substantial contact with the floor.
4. Window U-Factors are lower – 13% or less = U-.34, 25% or less = U-.32 or Unlimited = U-.30

Mechanical Changes:

1. Blower door and duct testing required. **Must have certificate from testing agency showing test results.** Building leakage maximum = .00030. Duct is a calculated number which will be on energy code checklist.
2. Push to install furnace and ducts within the conditioned space. No duct testing required if this is the case.
3. Programmable thermostat with 5-2 schedule required.
4. Ventilation requirements went back to IMC – no State Code anymore.
5. Continuously operating whole house fan now the norm – lower CFM and even quieter.
6. Duct sealing and testing required when replacing or altering furnace/air conditioning.

Lighting Changes:

1. 50% of all **indoor** fixtures must be high efficacy (lumen/watt ration) – fluorescent – but can be screw in.
2. Flourescent tubes must be T-8 or smaller.
3. Outdoor fixtures attached to the building must be pin based fluorescent. Or a motion sensor and photo daylight control.

And then the credits:

CHAPTER 9
ENERGY CREDITS (DEBITS)

OPTION	DESCRIPTION	CREDIT(S)

1a) **HIGH EFFICIENCY HVAC EQUIPMENT 1:** **1.0**

Gas, propane or oil-fired furnace or boiler with minimum AFUE of 92%,

or

Air-source heat pump with minimum HSPF of 8.5.

1b) **HIGH EFFICIENCY HVAC EQUIPMENT 2:** **2.0**

Closed-loop ground source heat pump; with a minimum COP of 3.3.

1c) **HIGH EFFICIENCY HVAC EQUIPMENT 3:** **1.0**

DUCTLESS SPLIT SYSTEM HEAT PUMPS, ZONAL CONTROL:
In home where the primary space heating system is zonal electric heating, a ductless heat pump system shall be installed and provide heating to at least one zone of the housing unit.

2) **HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:** **1.0**

All heating and cooling system components installed inside the conditioned space.
All combustion equipment shall be direct vent or sealed combustion.
Locating system components in conditioned crawl spaces is not permitted under this option.
Electric resistance heat is not permitted under this option.
Direct combustion heating equipment with AFUE less than 80% is not permitted under this option.

3a) **EFFICIENT BUILDING ENVELOPE 1:** **0.5**

Prescriptive compliance is based on Table 6-1, Option III with the following modifications:
Window U .= 0.28 floor R-38, slab on grade R-10 full, below grade slab R-10 full.

or

Component performance compliance: Reduce the Target UA from
Table 5-1 by 5%, as determined using EQUATION 1.1

3b) **EFFICIENT BUILDING ENVELOPE 2:** **1.0**

Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U .= 0.25 and wall R-21 plus R-4 and R-38 floor, slab on grade R-10 full, below grade slab R-10 full, and R-21 plus R-5 below grade basement walls.

or

Component performance compliance: Reduce the Target UA from
Table 5.1 by 15%, as determined using EQUATION 1.1

3c) **SUPER-EFFICIENT BUILDING ENVELOPE 3:** **2.0**

Prescriptive compliance is based on Table 6-1, Option III with the following modifications: Window U .= 0.22 and wall R-21 plus R-12 and R-38 floor, slab on grade R-10 full, below grade slab R-10 full and R-21 plus R-12 below grade basement walls and R-49 advanced ceiling and vault.

or

Component performance compliance: Reduce the Target UA from
Table 5.1 by 30%, as determined using EQUATION 1.1

4a) **AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION:** **0.5**

Envelope leakage reduced to SLA of 0.00020 building envelope tightness shall be considered acceptable when tested air leakage is less than specific leakage area of 0.00020 when tested with a blower door at a pressure difference of 50 PA. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances.

and

All whole house ventilation requirements as determined by Section M1508 of the Washington State Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.

4b) **ADDITIONAL AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION:** **1.0**

Envelope leakage reduced to SLA of 0.00015 building envelope tightness shall be considered acceptable when tested air leakage is less than specific leakage area of 0.00015 when tested with a

blower door at a pressure difference of 50 PA. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation, and combustion appliances.

and

All whole house ventilation requirements as determined by Section M1508 of the Washington State Residential Code shall be met with a heat recovery ventilation system in accordance with Section M1508.7 of that Code.

5a) **EFFICIENT WATER HEATING:** **.05**

Water heating system shall include one of the following:
Gas, propane or oil water heater with a minimum EF of 0.62.

or

Electric Water Heater with a minimum EF of 0.93.

and for both cases

All showerhead and kitchen sink faucets installed in the house shall meet be rated at 1.75 GPM or less. All other lavatory faucets shall be rated at 1.0 GPM or less.2

5b) **HIGH EFFICIENCY WATER HEATING:** **1.5**

Water heating system shall include one of the following:
Gas, propane or oil water heater with a minimum EF of 0.82.

or

Solar water heating supplementing a minimum standard water heater. Solar water heating will provide a rated minimum savings of 85 therms or 2000 kWh based on the Solar Rating and Certification Corporation (SRCC) Annual Performance of OG-300 Certified Solar Water Heating Systems.

or

Electric heat pump water heater with a minimum EF of 2.0.

6) **SMALL DWELLING UNIT:** **1.0**

Dwelling units less than 1500 square feet in floor area with less than 300 square feet of window + door area. Additions to existing building that are less than 750 square feet of heated floor area.

7) **LARGE DWELLING UNIT:** **-1.0**

Dwelling units exceeding 5000 square feet of floor area shall be assessed a deduction for purposes of complying with Section 901 of this Code.

8) **RENEWABLE ELECTRIC ENERGY:** **0.5**

For each 1200 kWh of electrical generation provided annually by on-site wind or solar equipment a 0.5 credit shall be allowed, up to 3 credits. Generation shall be calculated as follows:
For solar electric systems, the design shall be demonstrated to meet this requirement using the National Renewable Energy Laboratory calculator PVWATTs. Documentation noting solar access shall be included on the plans.
For wind generation projects designs shall document annual power generation based on the following factors:
The wind turbine power curve; average annual wind speed at the site; frequency distribution of the wind speed at the site and height of the tower.